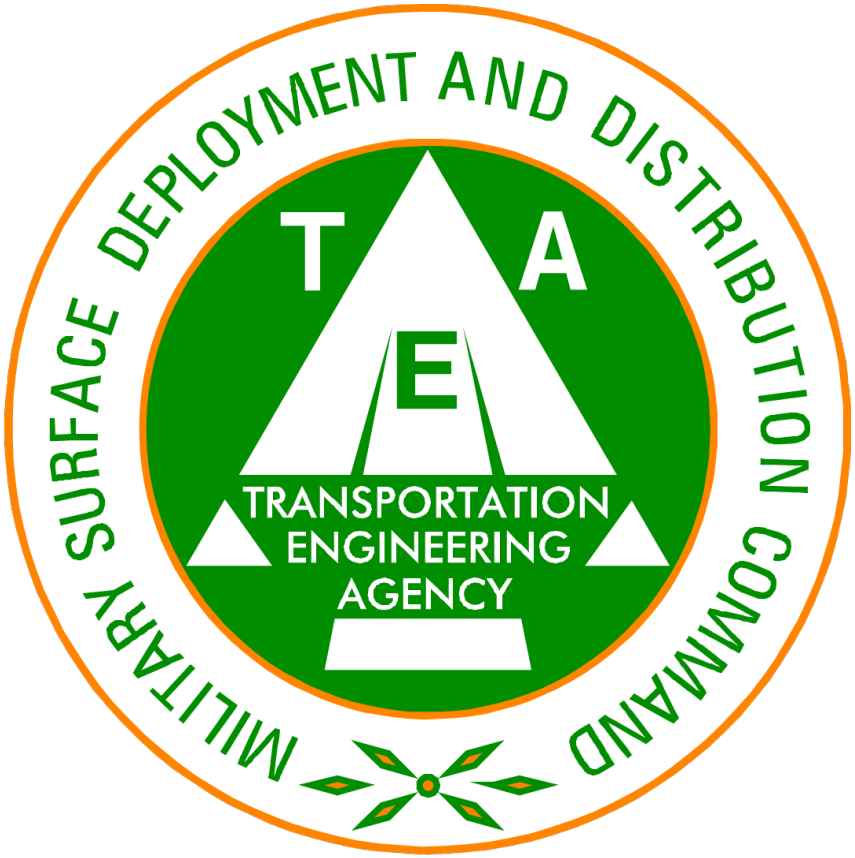
SDDCTEA - Turning Today's Visions Into Tomorrow's Strength



SDDCTEA

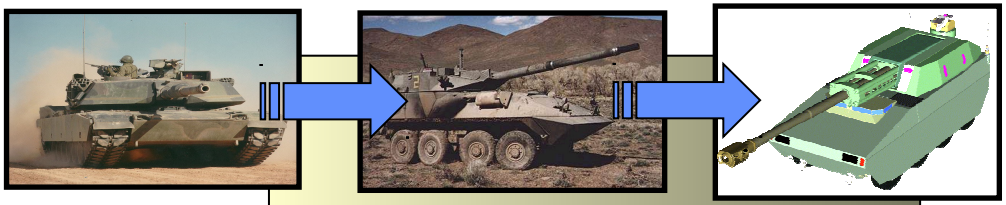
Unclassified

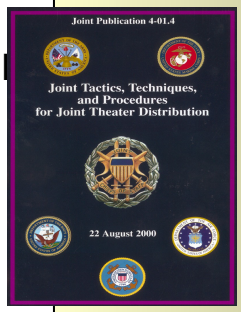
DoD's Premier Deployment Engineering and Analysis Center

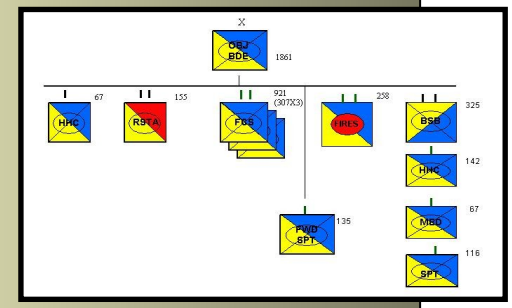
John T.H. Germanos
Deployability Engineering
Force Modernization Team

Deployability Engineering: Improving the Process

- Equipment Transportability
- DTS Assets
- DTS Infrastructure
- Force Structure and Deployment Plan
- Policy, Programmatics, and Doctrine
- Operations, Exercises, and Guidance







Deployability or Transportability?

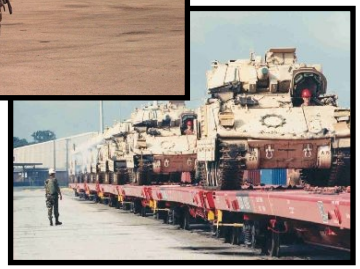
Equipment too wide for the railcar, proving once again that…

…size <u>DOES</u> matter!

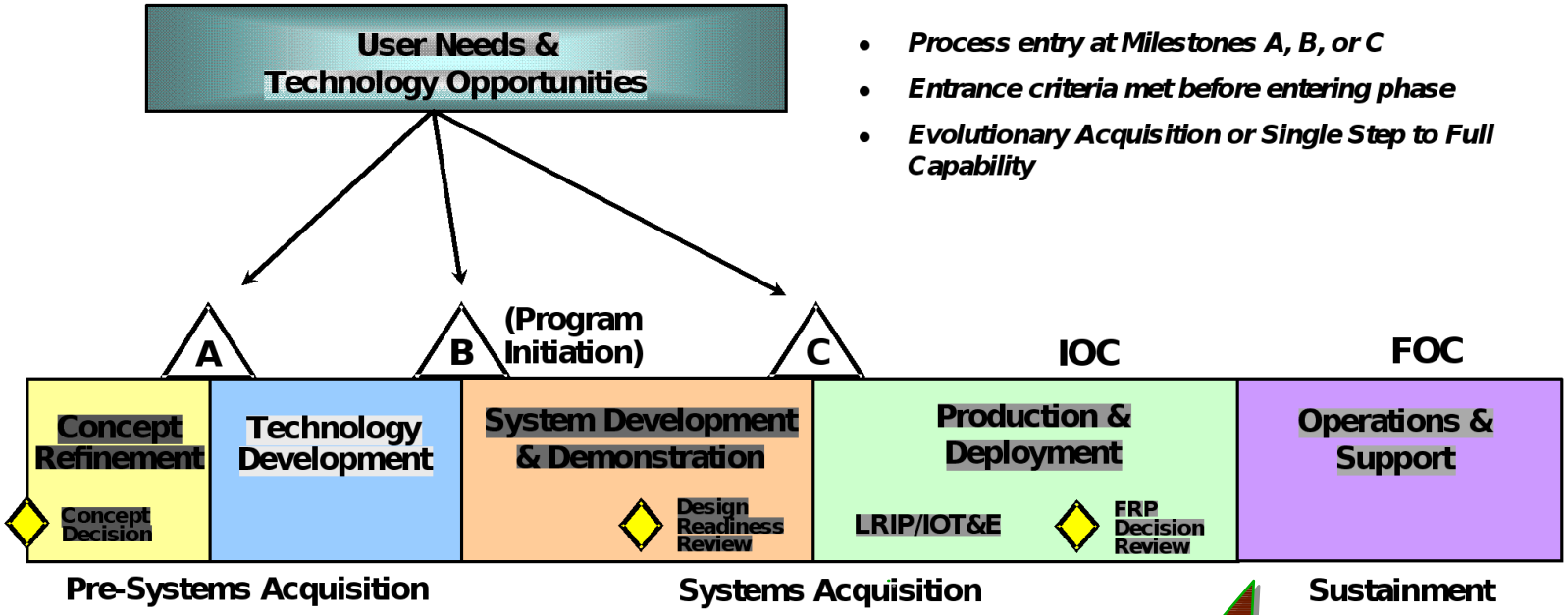
Transportability and Deployability

Transportability is the inherent capability of an item or system to be effectively and efficiently moved by required transportation assets and modes.

Deployability is the ability to move forces and materiel anywhere in the world in support of a military operation.



Acquisition Process: Getting In Early!



- *Process entry at Milestones A, B, or C*
- *Entrance criteria met before entering phase*
- *Evolutionary Acquisition or Single Step to Full Capability*

Streamlined Process!

Transportability Approval Process

- Provide input into MNS and CNS (now ICD).
- Help define transportability requirements for ORD (now CPD).
- Help translate CPD requirements into PD/Specification.
- Participate in Source Selection Evaluation Boards.
- Review Transportability Report.
- Analyze system characteristics to ensure CPD requirements are met.
- Provide transportability and deployability assessments for CBTDEV and MATDEV prior to MS B.
- Provide guidance and participate in transportability testing.
- Provide transportability approval, or provide corrective actions needed to obtain approval, prior to MS C.
- **Transportability approval is given and concurren with materiel release provided when the system meets its requirements.**

Assistance during every step!

Equipment Design Considerations

- Critical Design Considerations
  - Weight and Cube
  - Lifting and Tiedown Provisions
  - Interface with DTS Assets
  - Interface with DTS Infrastructure
  - Structural Integrity during Transport
- Ensuring Requirements are Met
  - Transportability Testing
  - Modeling and Simulation
  - Field Evaluation/Validation

Weight and Cube Considerations

Whether it's overhead clearance or bridge weight ratings...

...new equipment design must consider existing infrastructure constraints!

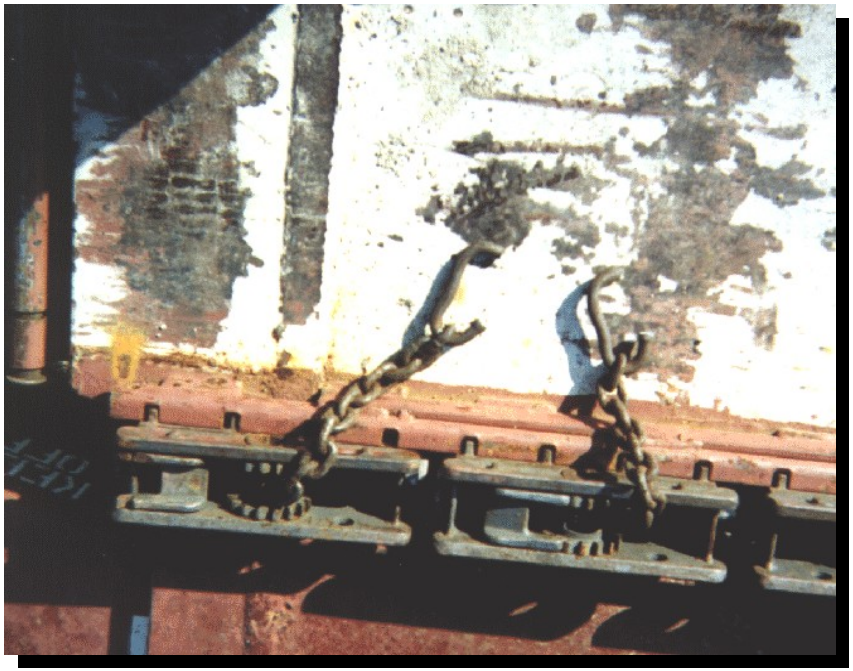
Lifting Considerations

Commercial off the shelf (COTS*) equipment is always "interesting!"

***COTS** – a notorious 4-letter word in the acquisition community!

Tiedown Considerations

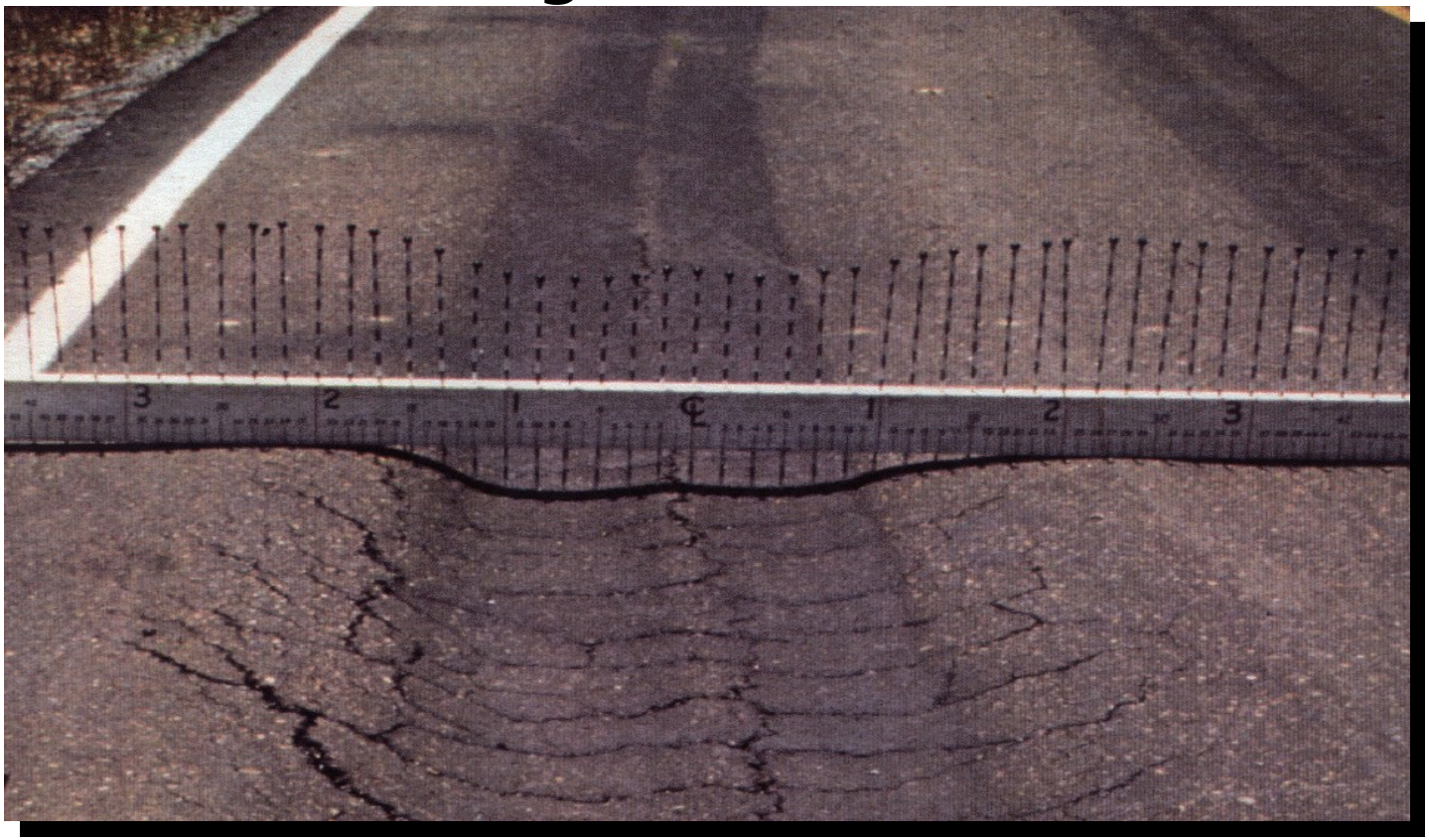
Six tiedown chains on the back of a HEMTT that snapped during rail transport from Ft. Hood, TX to Beaumont, TX



Rail transport has the highest longitudinal shock levels of any m

DTS Considerations

Understanding infrastructure constraints…



Road damage during HET Testing…

Asset, Infrastructure, or Equipment?

Designing to optimize lift asset compatibility!

- **This was at low tide, so things were not going to get any**
- **All equipment must be capable of crane lift – even on a R**

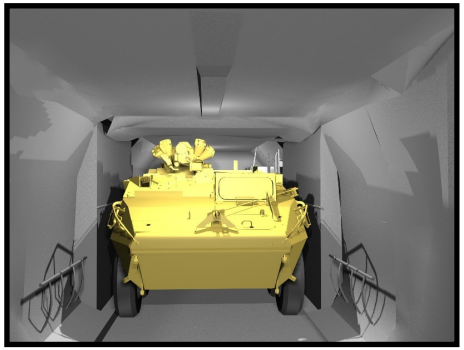
Structural Integrity!

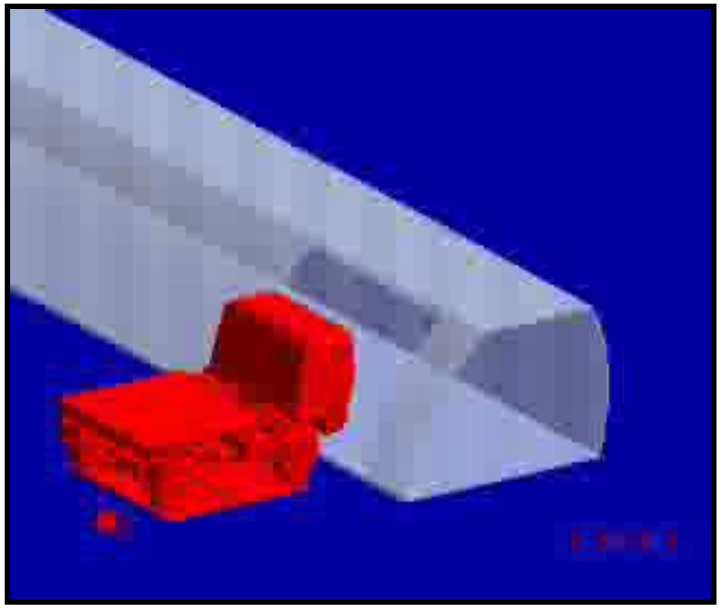
Utah
Apr 99

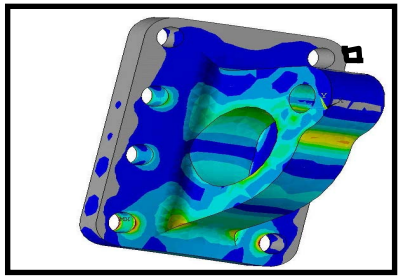
Tennessee Sep 02

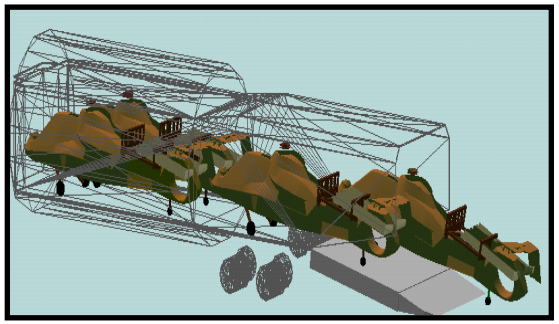
Transportability Modeling and Simulation

- 3D Modeling (ProEngineer)
- Finite Element Analysis
- Dynamic/Kinematic Analyses (DADS/ADAMS)

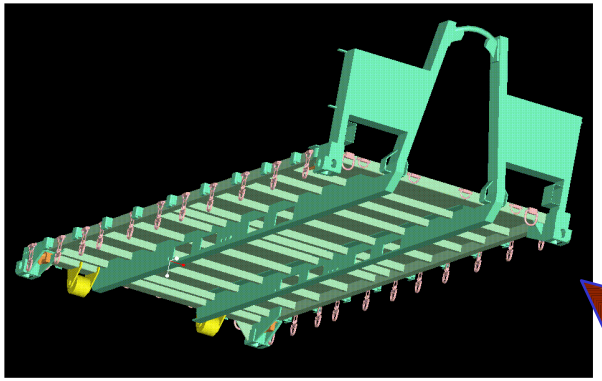


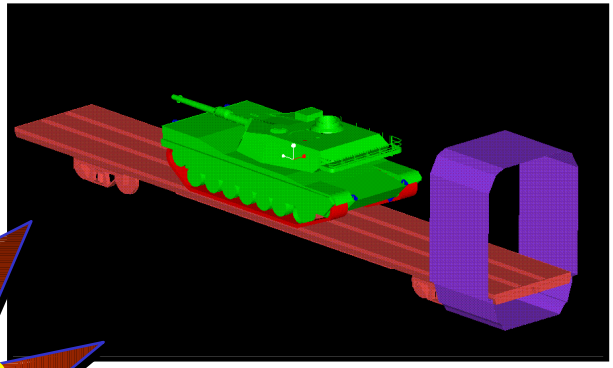




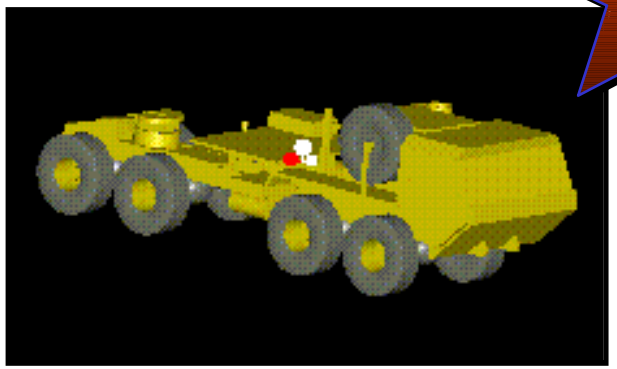


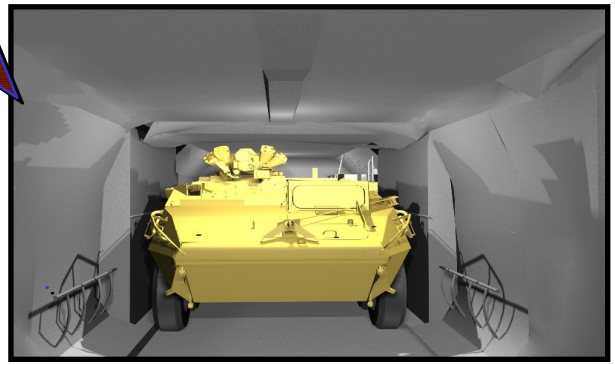
3-D Modeling



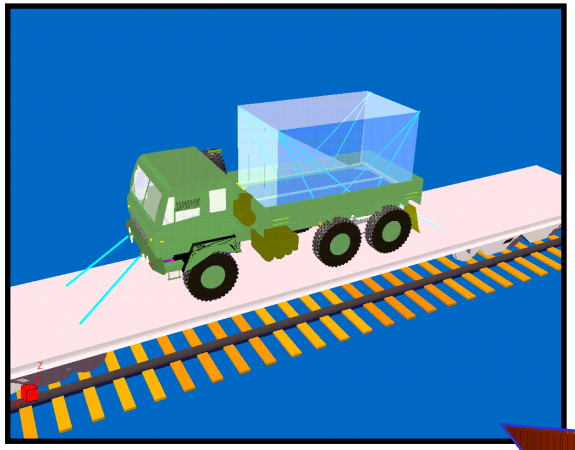


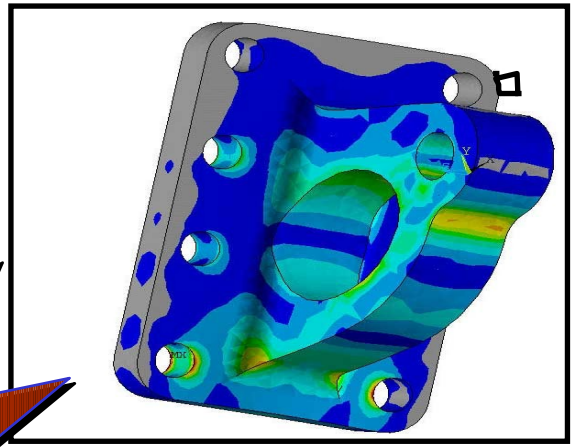
Determine Form and Fit



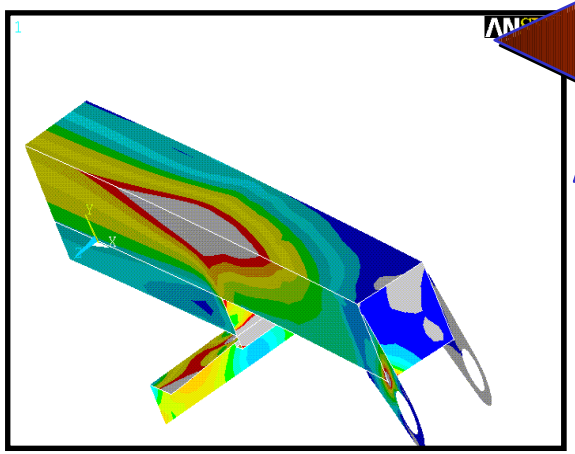


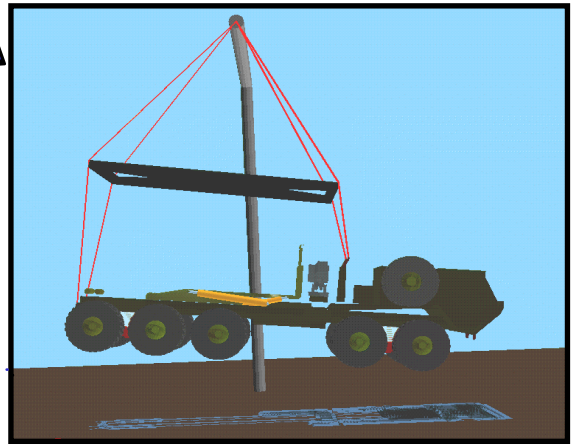
Structural Analysis and





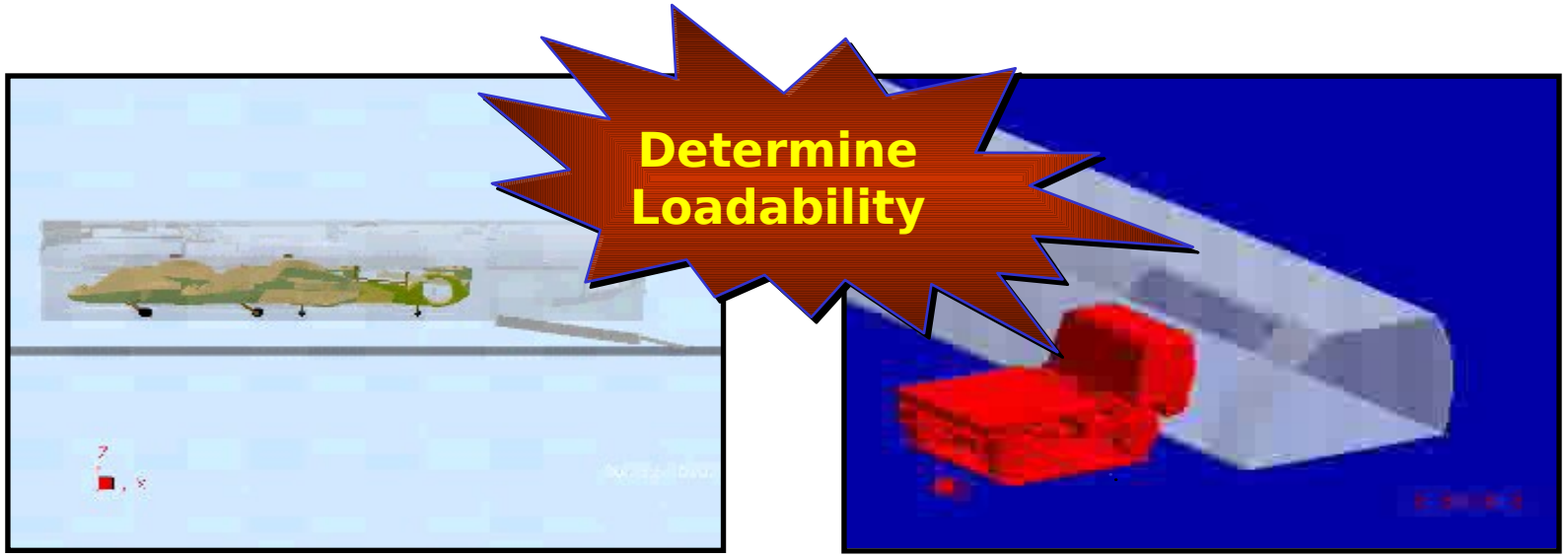
Determine Structural Integrity





Dynamic/Kinematic

- Assigns properties of motion to 3-D models
- Virtual loadings
  - Comanche loading into a C-130 & C-17
  - Military vehicle loading into a commercial cargo aircraft



Increasing the Probability of Success…

Demo loading to validate form and fit - Jan 02

Ramp Demo to validate structural integrity & loadability - May 02

Deployability Engineering: Improving the Process

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Maximizing DTS Asset Utility

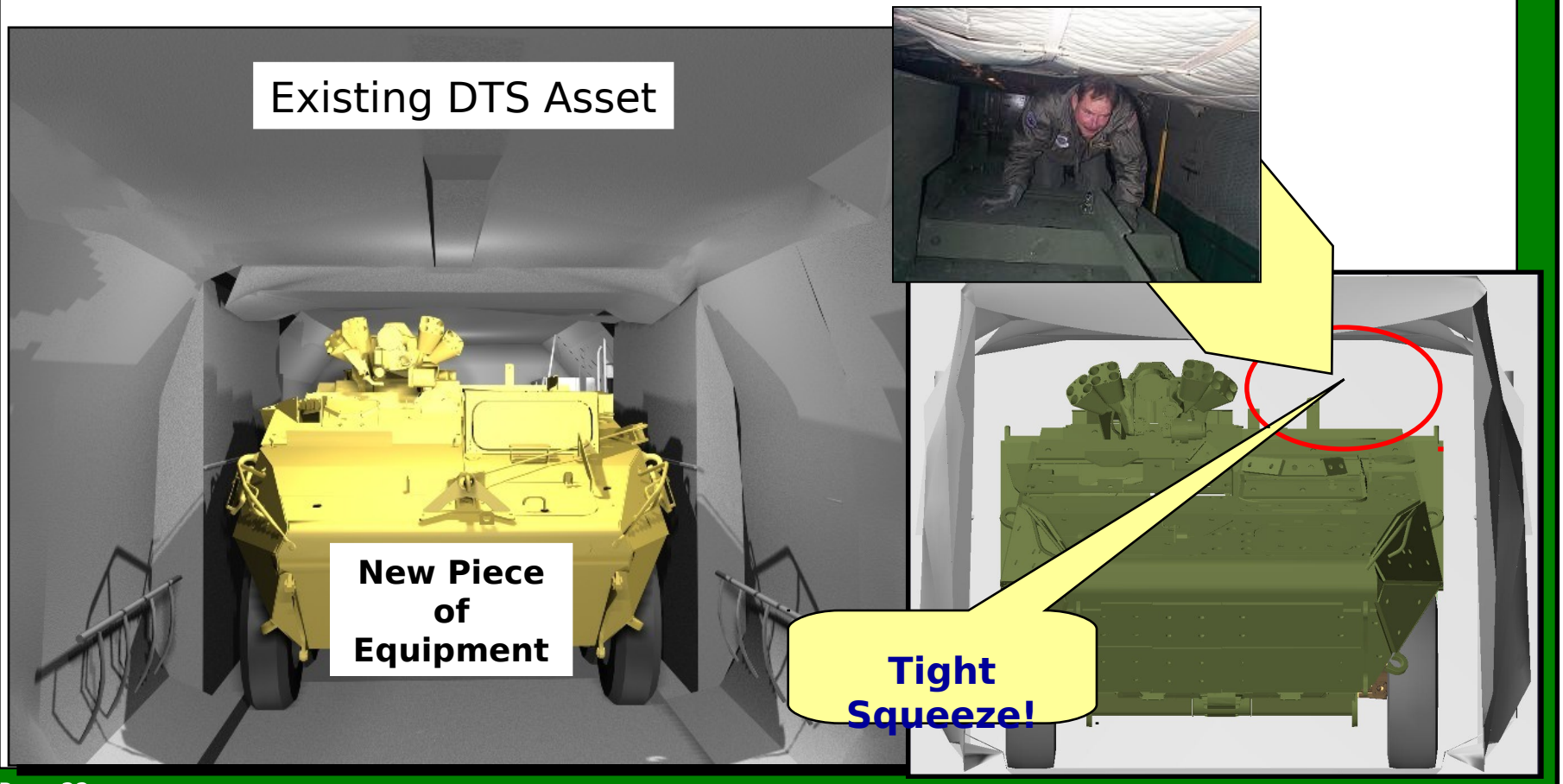
Concept Development

Fabrication

Recapitalization

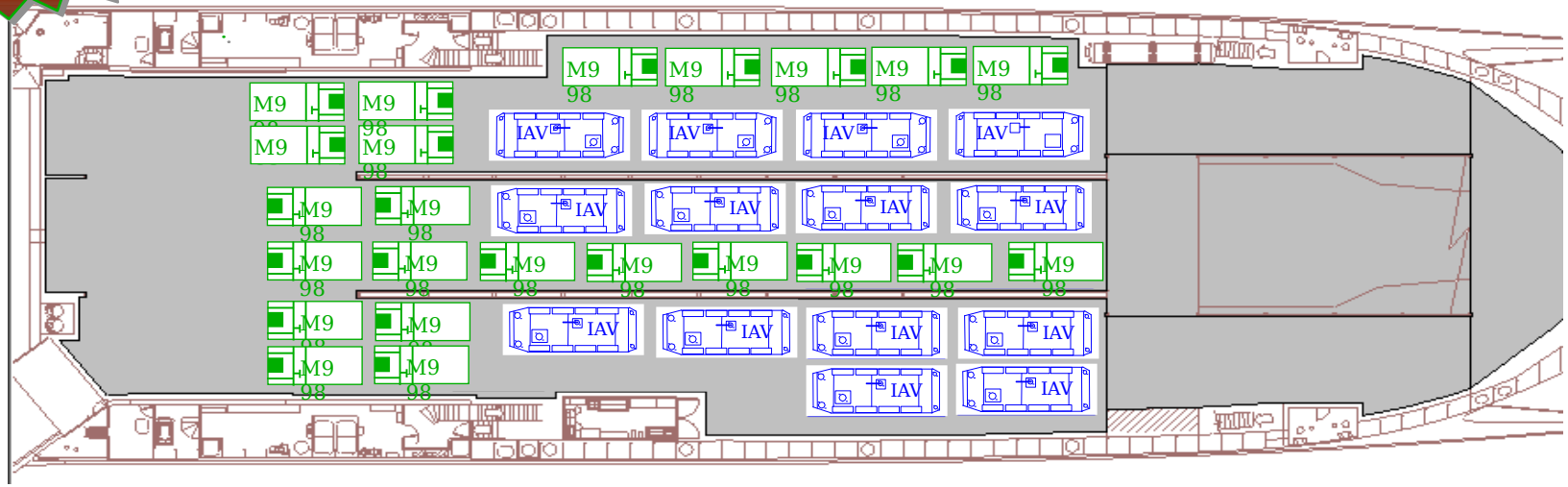
Understanding Existing DTS Assets

Stryker Infantry Carrier Vehicle (ICV) in a C-130



Analyzing/Designing Future Assets

ICODES



Model Number	Description	Quantity	Length	Width	Height	Weight	L/T	Area
			inches	inches	inches	pounds	long tons	sq.feet
M998	TRK UTIL CRG/TRP CARR	23	187	84	53	5280	2.36	109
Stryker	Infantry Combat Vehicle	14	284	110	109	38000	16.96	21
		37 grand tot.				653440 grand tot.	291.71 grand tot.	55

TSV also!

Potential Future DTS Assets

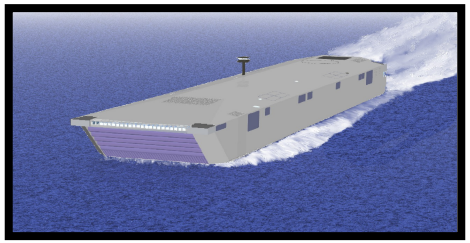
- High Speed Catamarans

- ~45 knots
- 650 tons
- Shallow draft

- **Light Aerial Multi-purpose Vehicle**

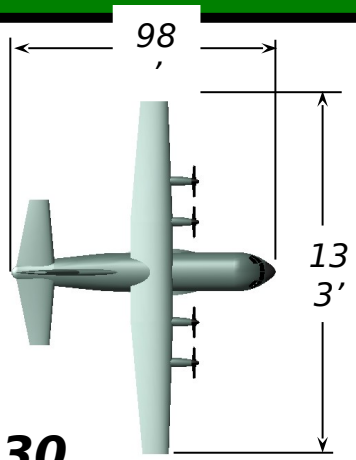
- **VTOL**
- **740 lb payload**
- **90 mile range**
- **350 MPH**

- Surface Effects Vessels

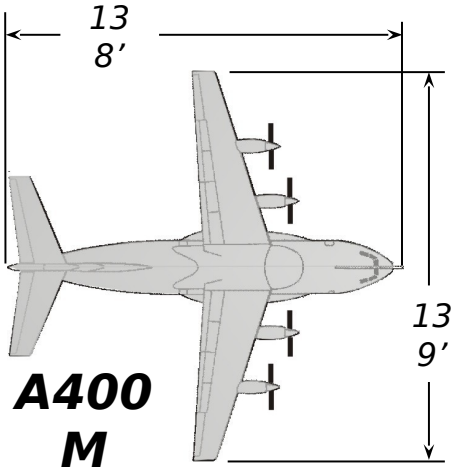


- ~65-100 knots
- ~5000 tons
- Austere Port

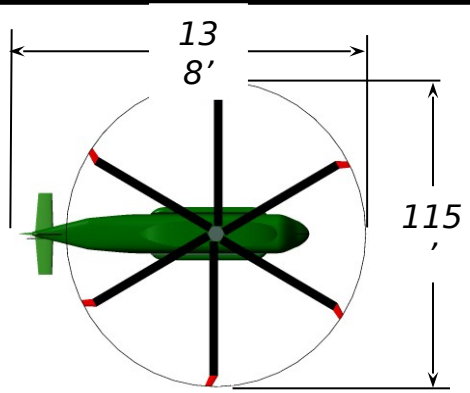
Potential Future DTS Assets



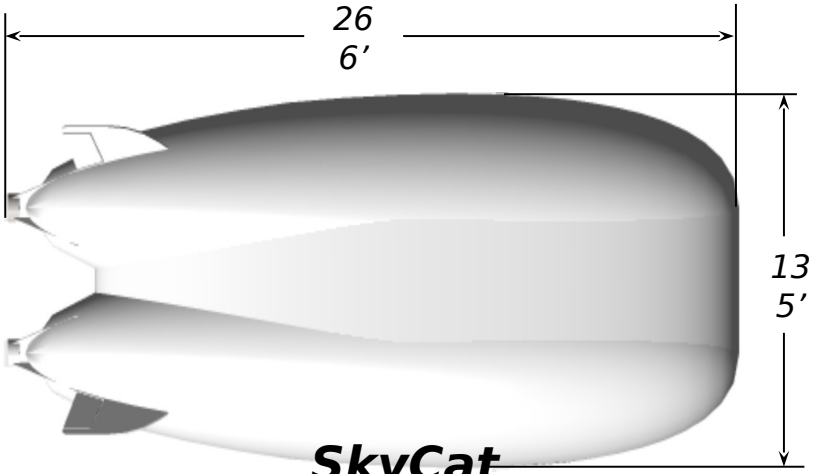
C-130



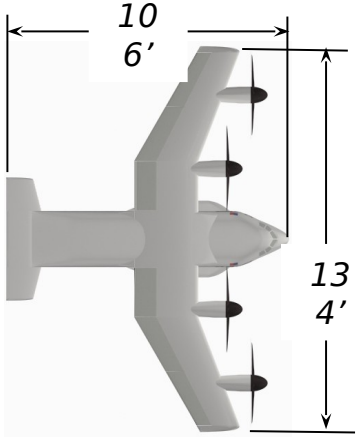
A400 M



FTR Helicopter



SkyCat 20



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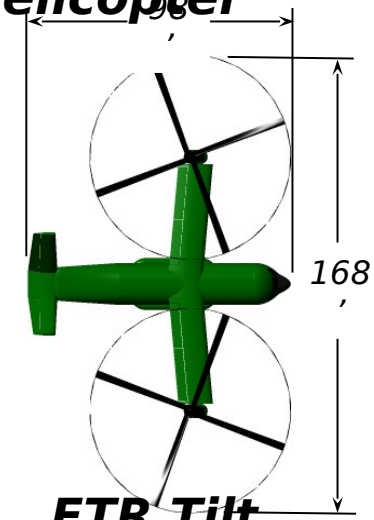

FTR Tilt Rotor

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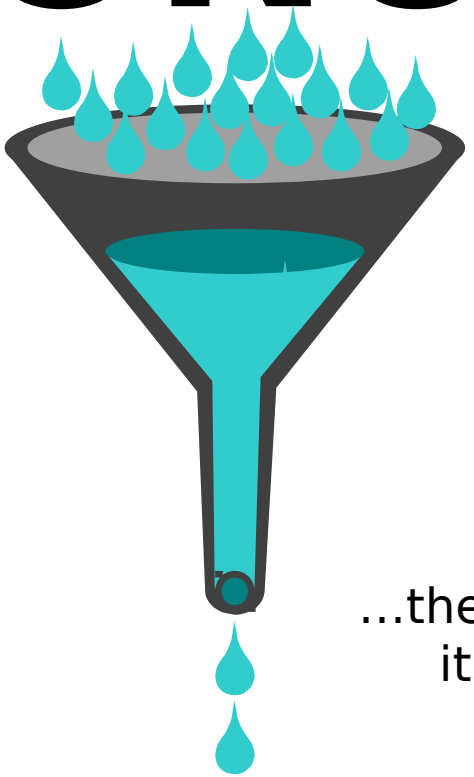
Understanding the REAL Challenge

CONUS

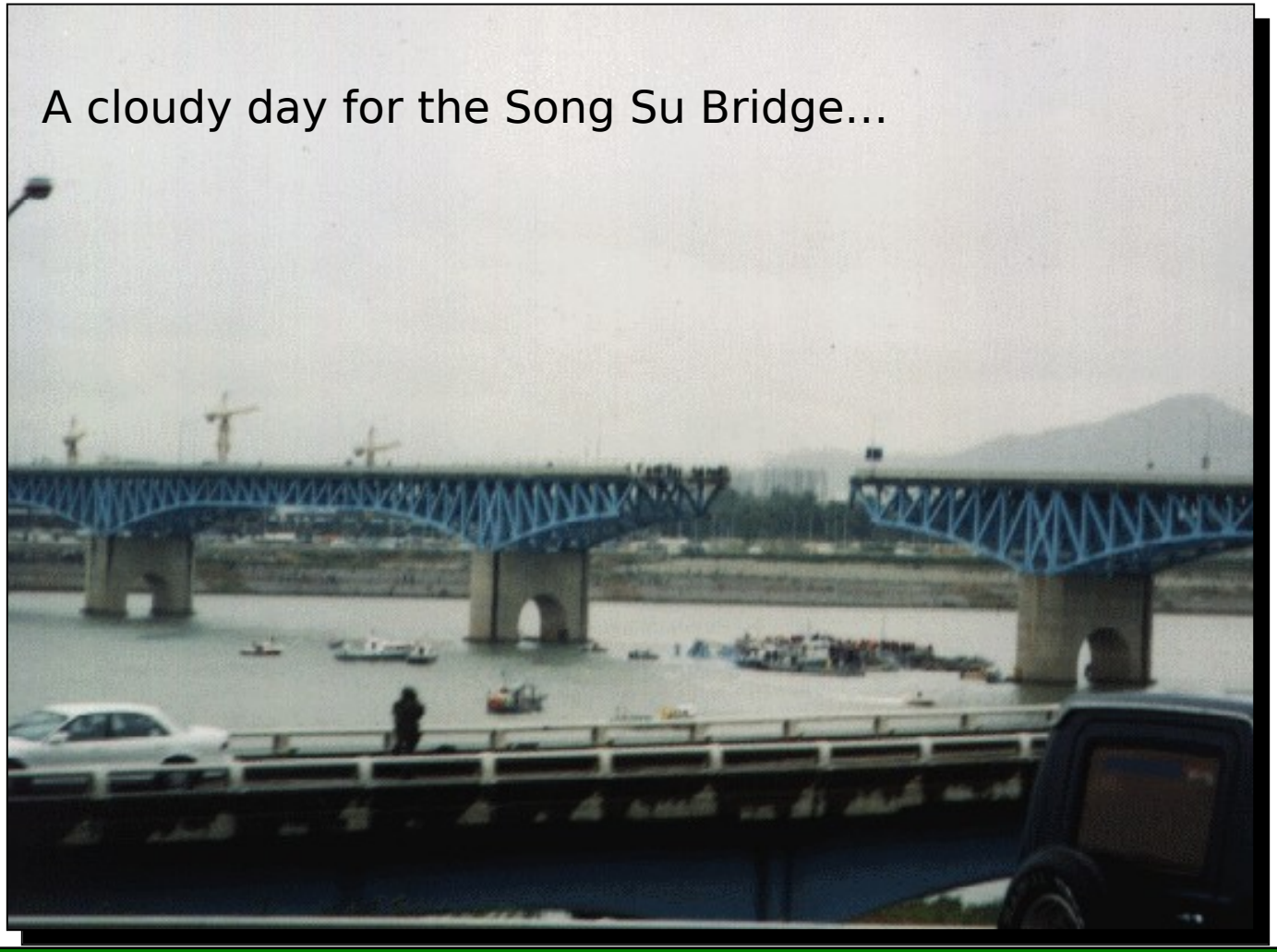


The weak link analysis…

…the DTS is only as good as its weakest link/node.

OCONUS

Korean Engineering at Work…



DTS Limitations

Inadequate taxiway strength. This was at an airfield in

Infrastructure Engineering Solutions

Conduct transportation engineering analyses of multi-modal nodes and networks that support power projection.

- **Determine capability and adequacy of infrastructure to deploy selected force packages.**

- **Recommend physical and process improvements.**

What's assumed.

What's there!

DTS Infrastructure Analysis Model

CONUS

ORIGIN → FORT → A/S POE

ISB

STRATEGIC LIFT

A/S POD

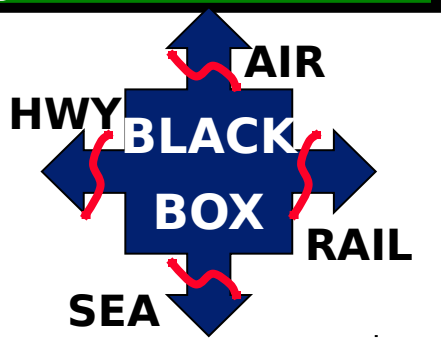
TAA

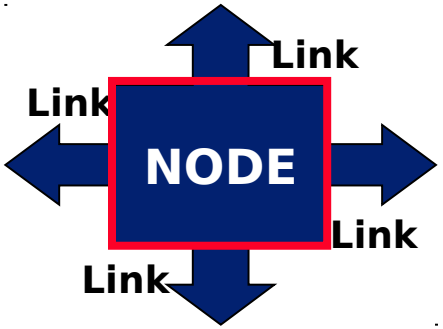
FOXHOLE

OCONUS

Traditional DTS Analyses

- ***Network* Analysis** (Links)
  - "Outside the Box"
  - Route Analysis (origin to destination)
  - Isolation/Connectivity
- ***Nodal* Analysis** (Nodes)
  - "Inside the Box"
  - Boundary-driven (Port, Area, Region, etc.)
  - Throughput Analysis for the Node
- ***Systems* Analysis** (Series of Links & Nodes)
  - "Fort to Foxhole," or "End-to-End"
  - Operational Impact Analysis
  - Applies Demand on DTS (I.e., the TPFDD)





Recent Army Applications

- Sierra Army Depot
  - Runway Extension - $14M
  - Apron Expansion - $6M
  - A/DACG Facility - $3.6M
- Ft Bragg
  - Vehicle Weigh Station & Marshaling Area Control Center - $8.6M
- Ft Campbell
  - Heavy Drop Rigging Facility - $9.9M
  - K-Loader Support Facility - $2M
- Ft Carson
  - Parking Apron 7 Taxiway - $29M
  - A/DACG & IRC Facility – $23M
- Ft Dix
  - Pallet & Vehicle Processing - $4M
  - Apron & Taxiway Repair - $10M
- Ft Riley
  - Ramp Expansion - $4.95M
  - Deployment Support Facility - $3M
  - A/DACG Facility - $3M
  - Alert Holding Area - $5M
  - Pallet Processing Facility - $8M
- Ft Pickett
  - Railhead & Marshaling - $11M

For Detailed Info Call:

Mr. Ralph Compton

757-599-1186

Available Port Studies

- **SWA:** Kuwait, Saudi Arabia, United Arab Emirates, Qatar, Bahrain, Oman
- **Europe:** Belgium, Germany, Italy, Netherlands, Turkey, Bulgaria, Romania
- **Asia:** Korea, Japan
- **South America:** Panama, Costa Rica
- **CONUS:** Charleston NWS, MOTSU
- **Crisis Action:** India, Pakistan, Djibouti, Kenya, Eritrea, Yemen, Egypt, Liberia, Iraq
- **Special Studies:** Maldive Islands, Cook Islands, Diego Garcia, Port Accessibility Study
- **Partnership for Peace (PfP):** Albania, Croatia, Estonia, Latvia, Lithuania

Available on CD-ROM and via the WWW!

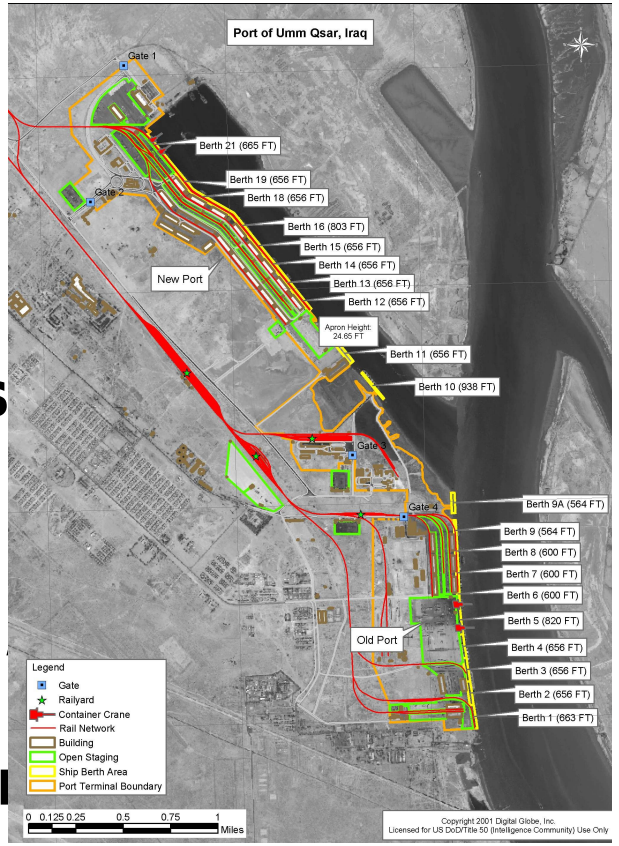
http://www.tea.army.mil

Restricted Area

Requires User ID and Password

Infrastructure Data Sources

- **Site Surveys**
- **Imagery**
  - **Commercial**
  - **National Technical**
- **Off-the-Shelf World Port Refs**
  - **(Guide to Port Entry, Fairplay, etc…)**
- **Intelligence (JICTRANS, DIA, ONI JWAC)**
- **In-house Imagery and Networ Analysis**
- **Other (Anything out there)**



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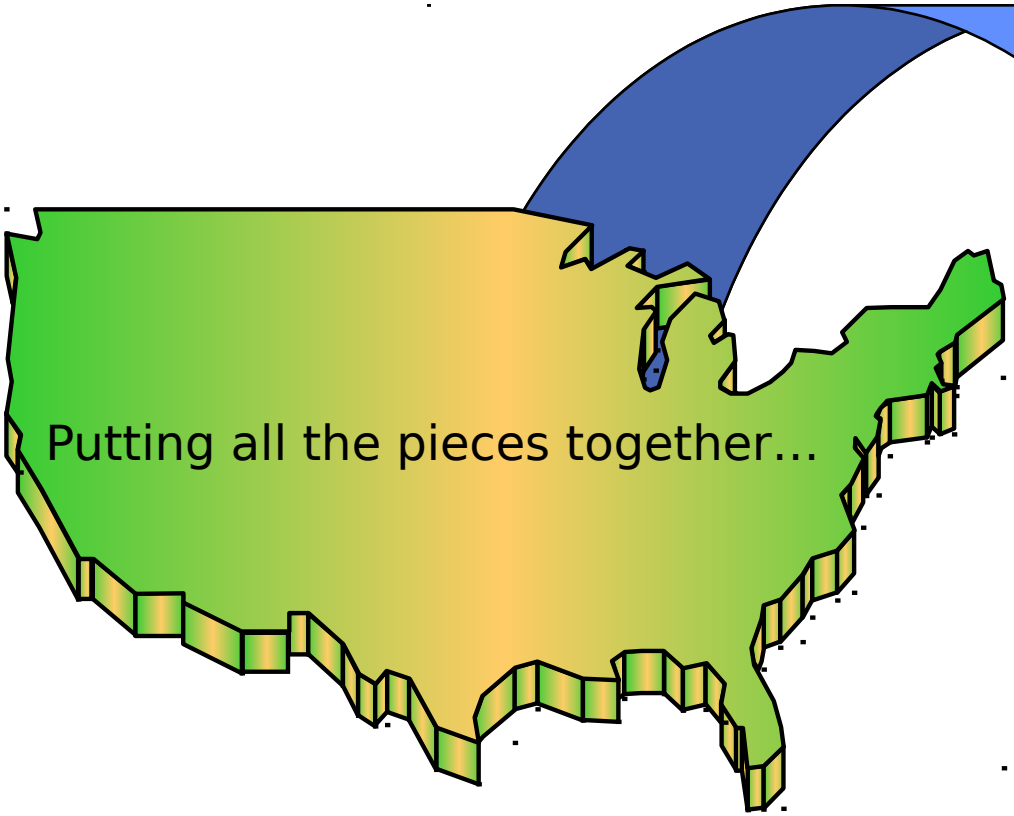
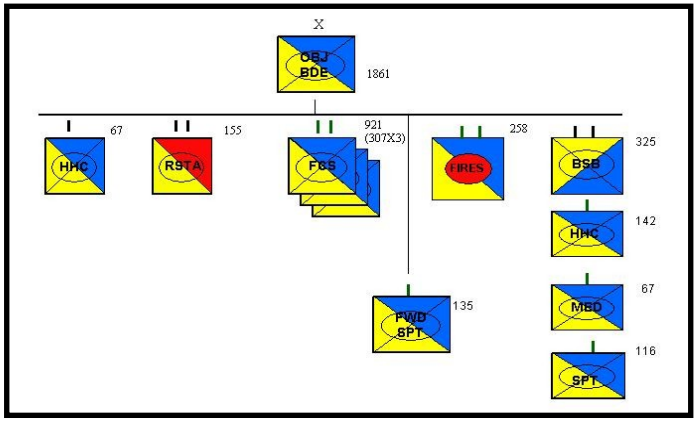
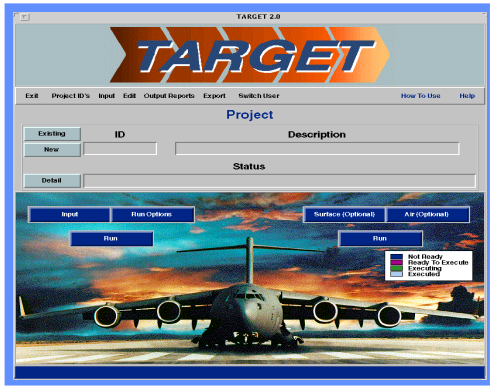
Why Structure and Plans?



Force Structure and Deployment Plans

- Evaluate Deployability of Forces
  - Constraints
    - Equipment Fit
    - Available Assets
    - Infrastructure Limitations
- Use Modeling and Simulation Tools
  - COCOM Support
  - Wargames
  - Infrastructure Analysis





Deployment Analysis Applications

ELIST

PORTSIM

ORIGIN → FORT → A/S POE → ISB

DSAT

JFAST/
MIDAS

A/S POD

PORTSIM

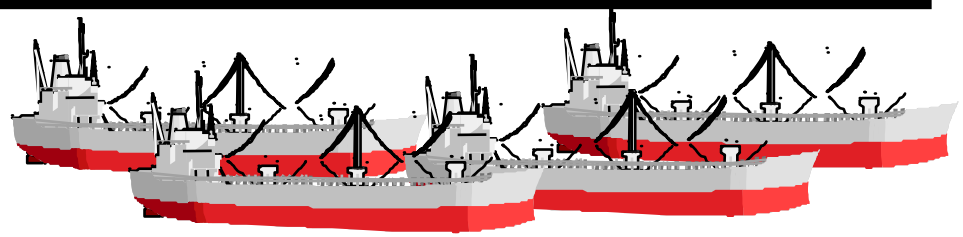
TAA

ELIST

FOXHOLE

Deployment Analysis

- Measures the impact that a change in the force structure or a new item will have on the deployability of the force.



How fast?

Deployability Engineering: Improving the Process

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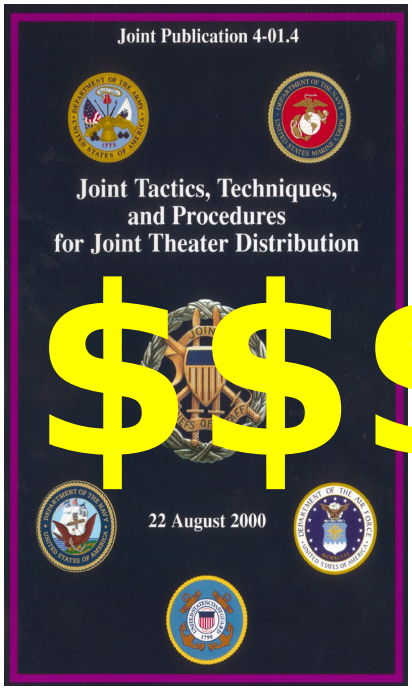
Why Policy, Programmatics, and Doctrine?

Better to be a Part of the Process...



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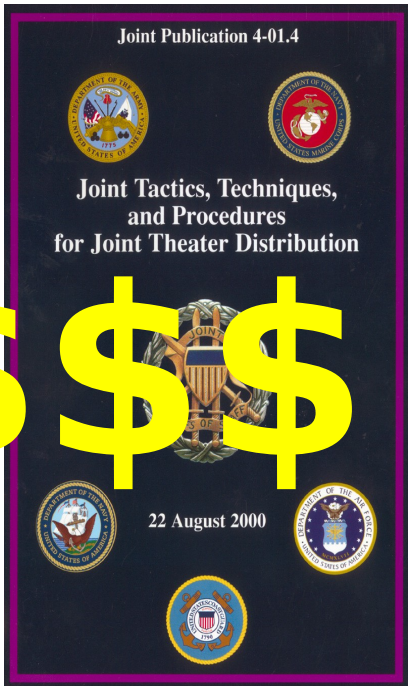
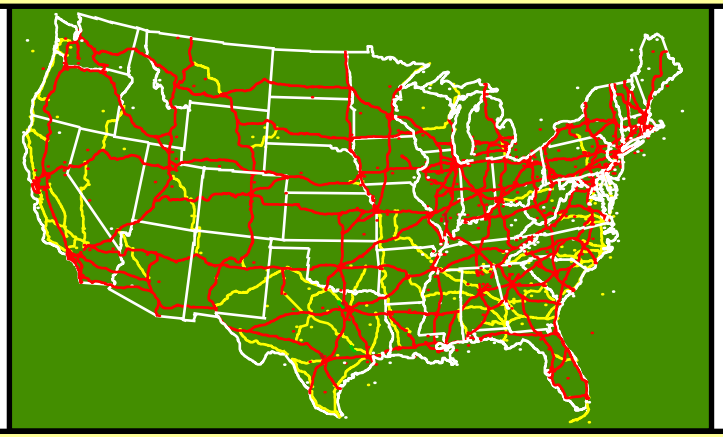


...than a Victim of It!

Policy

- Highways for National Defense
- Railroads for National Defense
- **Ports for National Defense**
- Defense use of Intermodal Systems

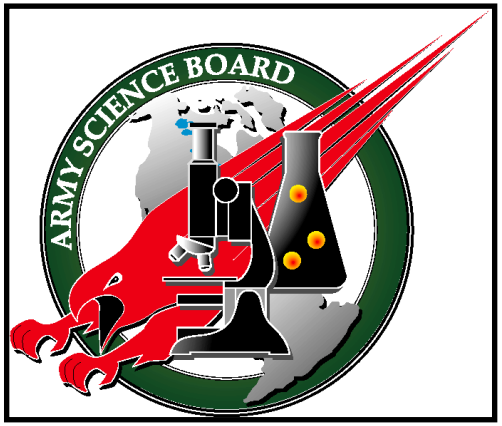
Advocate for DOD use of public and commercial infrastructure!

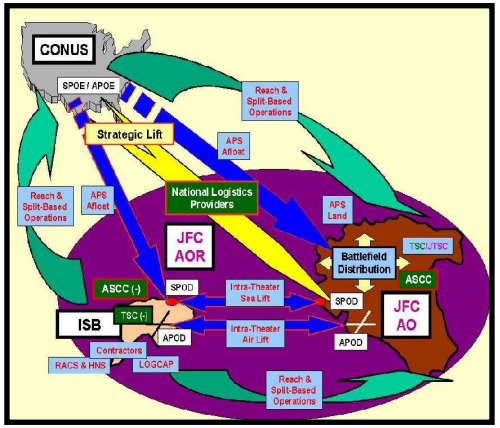


Assisting Fort Lewis on movement of Strykers by Highway

Programmatics and Doctrine

- Army Science Board
- Intermediate Staging Base
- SBCT Organizations and Operations
- Advanced Mobility Concepts Study
- Quadrennial Defense Review
- [illegible]ce S[illegible]

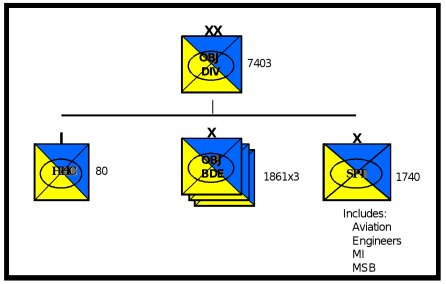


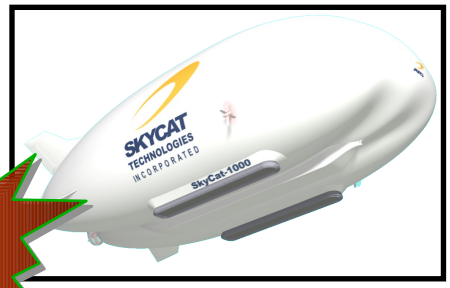


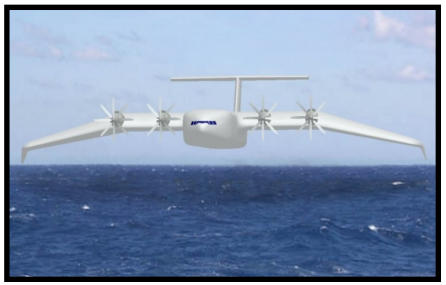
AP3 Baseline Deployment Study

AP3
ARMY POWER PROJECTION PROGRAM

- Infrastructure
- Future Lift Assets
- Future Force Structure



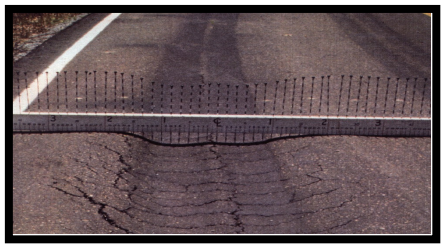




ASMP Follow-on

Where the Money May Go

- Explore and Exploit Commercial Technologies
  - Intermodalism
  - **Aircraft**
  - **Watercraft**
  - Alternative Fuels
  - Battery Technology
  - Lightweight Materials
  - Soil Stabilization and Pavement Technology



2000

Deployability Engineering: Improving the Process

- Equipment Transportability
- DTS Assets
- Infrastructure…the DTS
- Force Structure and Deployment Plans
- Policy, Programmatics, and Doctrine
- Operations, Exercises, and Guidance

Reality Engineering

Oops...

Rail “loading” at Ft. Hood, TX

M728 Combat Engineer Vehicle with an unlocked turret .

. . . . . hit this passing train. Fortunately nobody was inju re

Operations, Exercises, & Guidance

- Providing Expertise in the Field
- Lessons Learned (data, etc.)
- Deployment Guidance

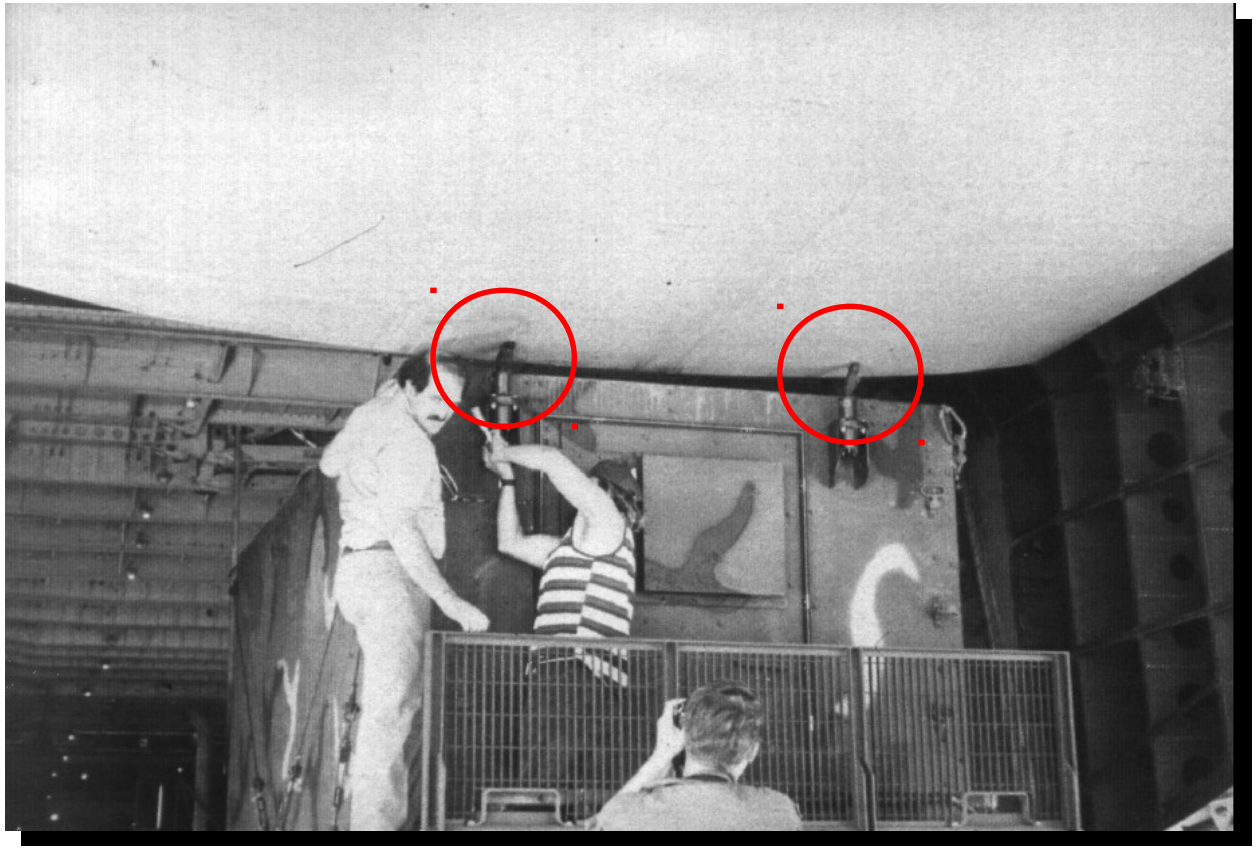
Why Follow Published Guidance?

An M2 that rolled off a trailer outside Ft. Irwin (tiedown failure).

Why Follow Published Guidance?

Published procedures are not always followed. This was done by the contractor loading team.

Antenna mounts stuck on the door of a C-5



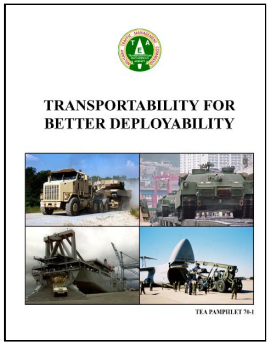
Fighting Gravity

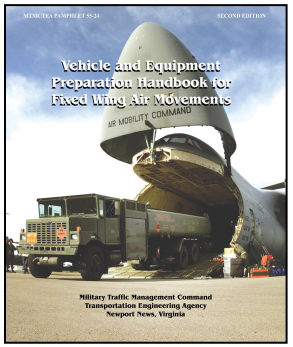
5-ton Truck dropped during Ship loading

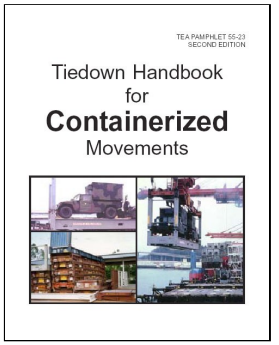
- **Stevedore incorrectly connected lifting sling to vehicle!**
- **If it looks like a lifting provision, someone will think it is one!**

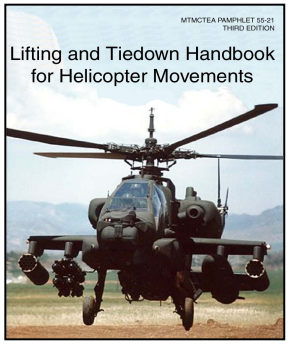
Gravity	**1**
Army	**0**

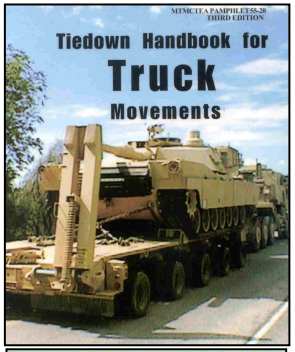
Pamphlets and Publications

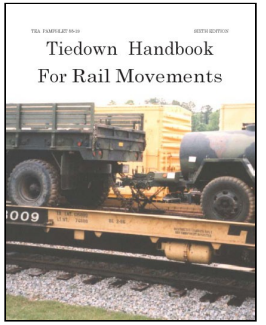


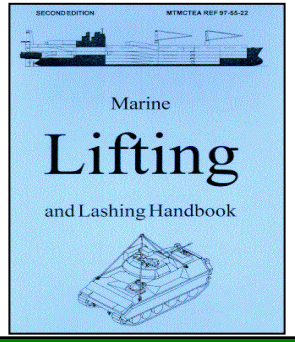


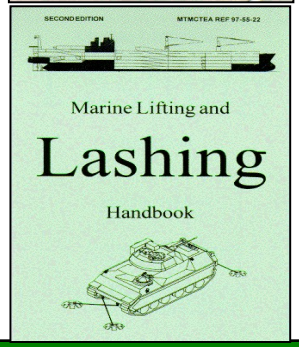


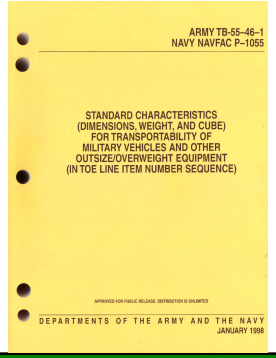






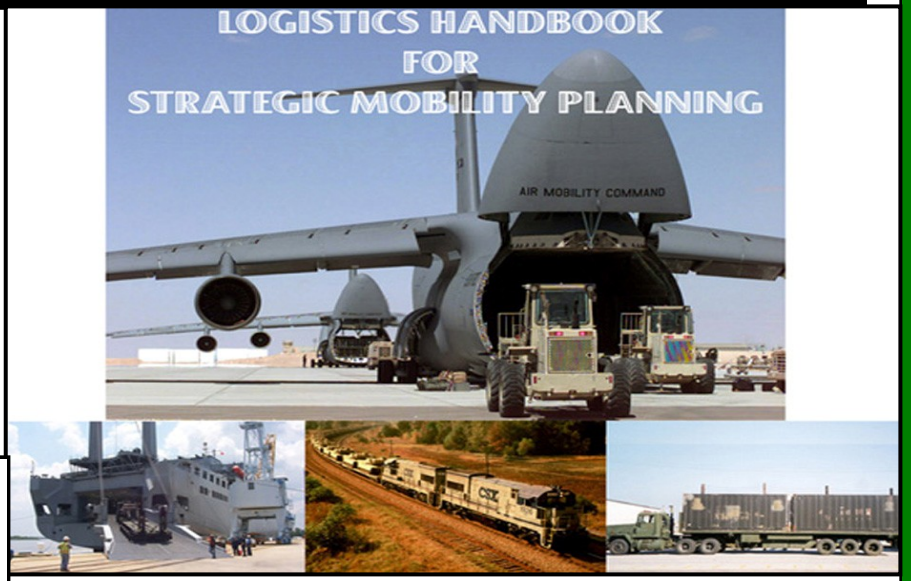


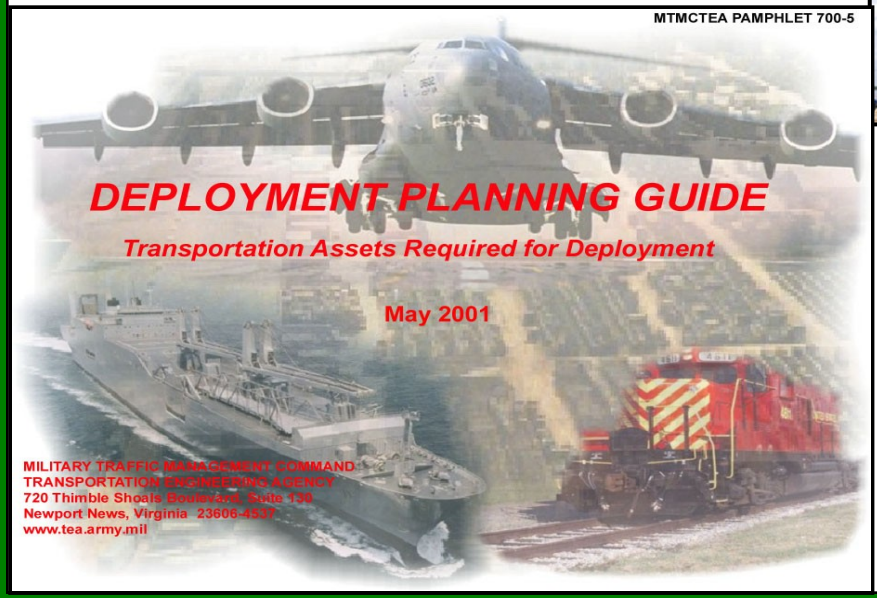




Pamphlets and Publications

Logistics Handbook for Strategic Mobility Planning, MTMCTEA Pam 700-2, Sep 2002

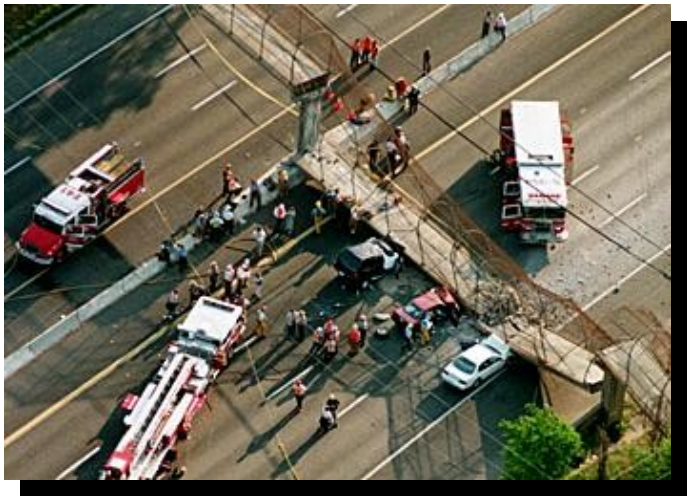




Deployment Planning Guide, MTMCTEA Pam 700-5, May 2001

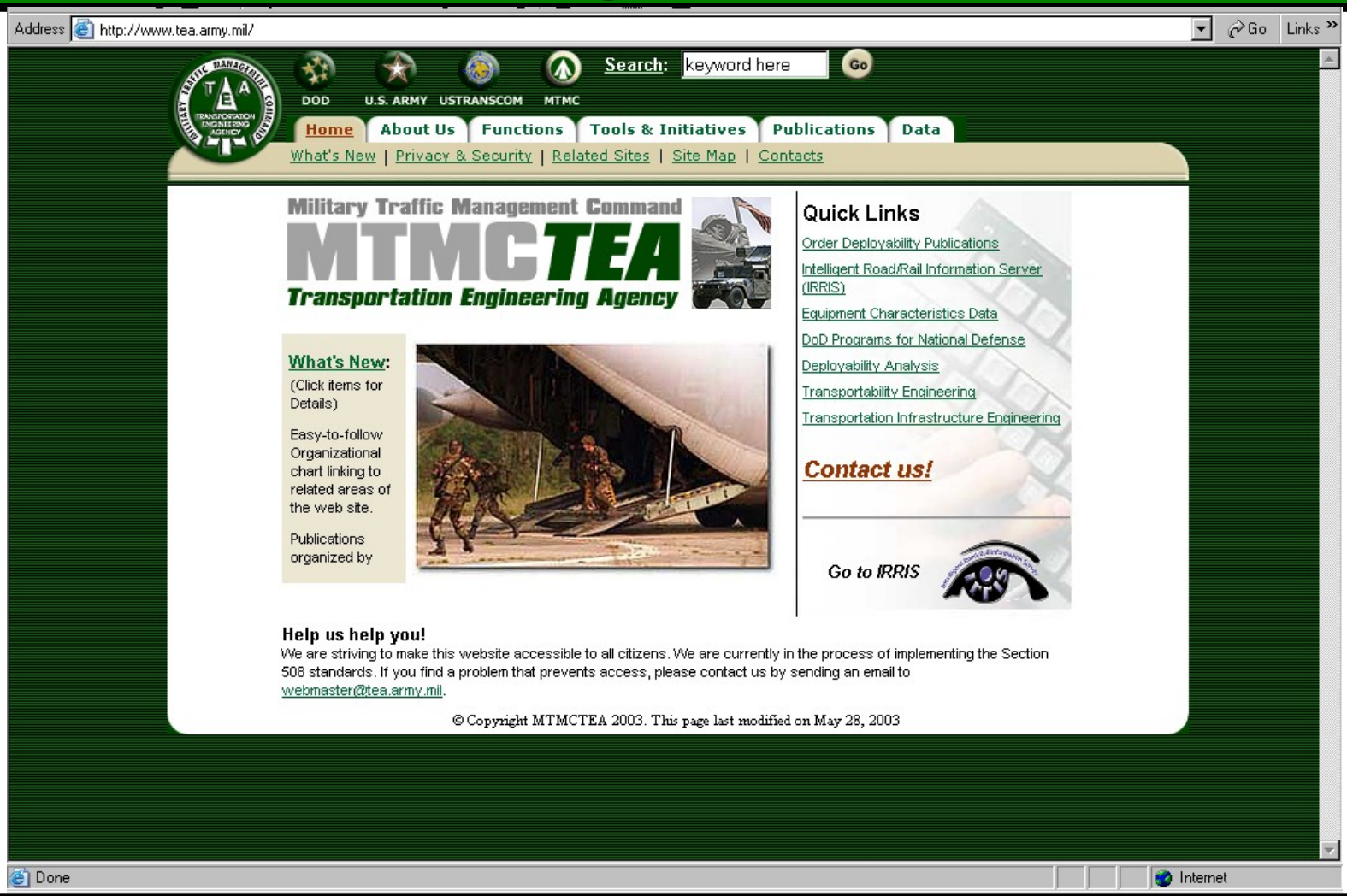
Published Limits are Real…

Fatal accident on the Baltimore Beltway 8 June 99



Published procedures are not always followed in the field!

Ordering Pamphlets



Ordering Pamphlets

Deployability Publications Order Form

Need help? Contact Deployability Publications

PUBLICATION		QTY
TEA Agency CD CD-ROM (Limited to 2 copies)	.PDF versions of pamphlets listed below	0
	Handbooks for Military Movements	
PAM 55-19 Hardcopy	*Tiedown Handbook for Rail Movements, 6th Edition. The pdf version of the 5th Edition will still be available for downloading.*	
PAM 55-20 Hardcopy	*Tiedown Handbook for Truck Movements*	
PAM 55-21 Hardcopy	*Lifting and Tiedown of US Military Helicopters*	
PAM 55-22 Hardcopy	*Marine Lifting and Lashing Handbook*	
PAM 55-23 Hardcopy	*Containerization of Military Vehicles*	
PAM 55-24 Hardcopy	*Vehicle Preparation handbook for Fixed Wing Air Movements*	
	Planning and Users' Guides	
PAM 70-1 Hardcopy	*Transportability for Better Deployability*	
PAM 700-2 Hardcopy	*Logistics Handbook for Strategic Mobility Planning*	
PAM 700-4 Hardcopy	*Vessel Characteristics for Shiploading*	
PAM 700-5 Hardcopy	*Deployment Planning Guide*	
PAM 700-6 Hardcopy	*LMSR Users' Manual*	

Cost

Q: How much does TEA charge for it's Transportability servi

A: <u>Nothing!</u> TEA is funded by the Transportation Working Ca Fund (TWCF) to provide transportability services to the A part of the Army Engineering for Transportability progra may sometimes need funding for travel above and beyon normal scope of its Transportability work.

Deployability Engineering: TEA's Core Competency

- Equipment Transportability
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- DTS Assets
  Joe Cassidy: 757-599-1630
- Infrastructure
  Ralph Compton: 757-599-1186
- Force Structure and Deployment Pla
  Gary Masters: 757-599-1174
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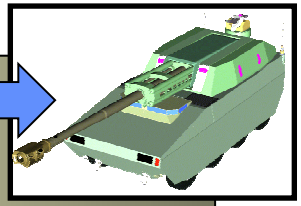
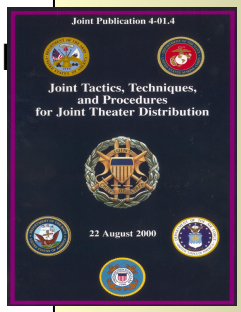
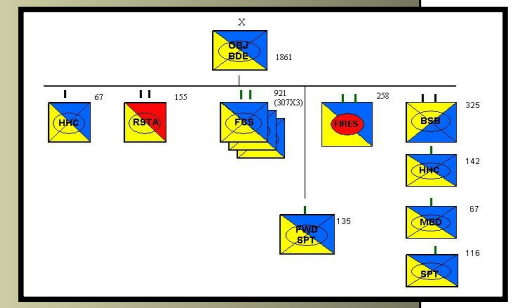
  Gary Masters: 757-599-1174
- Operations, Exercises, and Guidance
  Mike Williams: 757-599-1639







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